Erratum to: Search for dark matter and unparticles in events with a Z boson and missing transverse momentum in proton-proton collisions at $\sqrt{s} = 13$ TeV

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Abstract: A search for dark matter and unparticle production at the LHC has been performed using events containing two charged leptons (electrons or muons), consistent with the decay of a Z boson, and large missing transverse momentum. This study is based on data collected with the CMS detector in 2015, corresponding to an integrated luminosity of 2.3 fb^1 of proton-proton collisions at the LHC, at a center-of-mass energy of 13 TeV. No excess over the standard model expectation is observed. Compared to previous searches in this topology, which exclusively relied on effective field theories, the results are interpreted in terms of a simplified model of dark matter production for both vector and axial vector couplings between a mediator and dark matter particles. The first study of this class of models using CMS data at $\sqrt{s} = 13$ TeV is presented. Additionally, effective field theories of dark matter and unparticle production are used to interpret the data.

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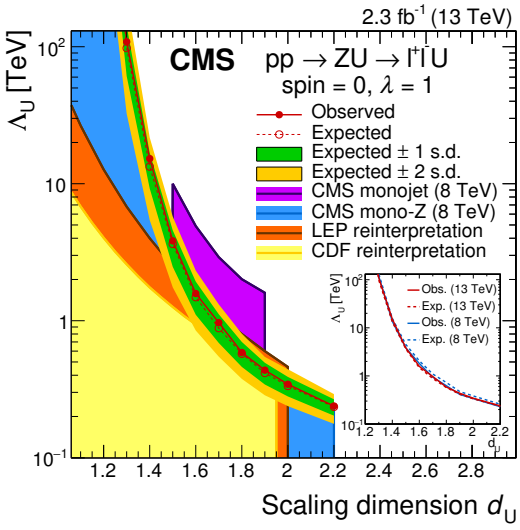

Figure 10. The 95% CL lower limits on the effective unparticle cutoff scale Λ_U for a fixed coupling $\lambda = 1$. The results from the CMS monojet [1] and mono-Z [2] searches, as well as a reinterpretation of LEP and CDF searches [3] are shown for comparison. The LEP results assume a coupling of unparticles to Z bosons and photons. The CDF (CMS) monojet result is based on a gluon-unparticle coupling operator (gluon- and quark-unparticle coupling operators). The inset compares the expected and observed limits for the CMS mono-Z analyses at $\sqrt{s} = 8$ and 13 TeV. Note that the cutoff scales Λ_U for different operators do not have to be identical. Consequently, the comparison shown here with the results other than the CMS 8 TeV mono-Z analysis is only qualitative.

In the original paper, figure 10 was incorrect. The correct figure is shown above.

References

[1] CMS collaboration, *Search for dark matter, extra dimensions and unparticles in monojet events in proton-proton collisions at* $\sqrt{s} = 8$ *TeV*, *Eur. Phys. J.* **C 75** (2015) 235 [arXiv:1408.3583] [INSPIRE].

[2] CMS collaboration, *Search for dark matter and unparticles produced in association with a Z boson in proton-proton collisions at* $\sqrt{s} = 8$ *TeV*, *Phys. Rev.* **D 93** (2016) 052011 [arXiv:1511.09375] [INSPIRE].

[3] S. Kathrein, S. Knapen and M.J. Strassler, *Bounds from LEP on unparticle interactions with electroweak bosons*, *Phys. Rev.* **D 84** (2011) 015010 [arXiv:1012.3737] [INSPIRE].

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